CONTRIBUTIONS TO THE BRYOPHYTE FLORA OF TURKEY

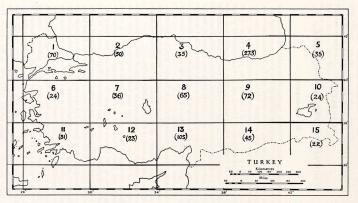
V: SUMMARY OF PRESENT KNOWLEDGE

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This present paper attempts to bring together all the published information on the bryophyte flora of Turkey, including my four previous contributions, and to assess the significance of the content and the internal distribution of the flora so far as the data will allow. Nothing is more certain than that the information is incomplete. Nevertheless, I shall consider this paper to have served its prime purpose if it indicates the gaps in knowledge of the flora and in what regions of Turkey and on what taxonomic groups attention must be focused if these are to be filled. I cannot hope to have discovered every paper dealing with bryophytes with Turkish records; in this respect I should welcome corrections and additions. Also, I have not scrutinized herbaria for the many records which may be buried therein. Due to the uncertainty of the original source of the information I have not included all the many occasions where Asia Minor is cited in the distribution of a species in major works; I prefer to rely on papers where the exact collections are cited in detail.

In this paper I have excluded Turkey in Europe. It represents only a small portion of the land mass of the country and to have included it would have necessitated scrutiny of many works on the Balkan bryophyte flora without adding much to our overall information.

There are, however, much more serious sources of error inherent in a compilation of this type. The results may suffer very heavily both from insufficient coverage of the country, some areas may have been visited repeatedly and others untouched, and from taxonomically uneven collecting. Prior to Dr. Davis's expeditions the south-east was almost unknown bryologically and central and south-west Turkey west of 34°E. is still in that condition. The second point, uneven representation of groups, is probably inherent in all works where most of the collectors do not have a working knowledge of the plants. For instance it is at once apparent that the Hepaticae are grossly under-represented. This lack is emphasized by the one exception, Handel-Mazzetti's paper (1909) on the north-eastern corner bordering the Black Sea, which records quite a rich hepatic flora. In part this is a true reflection of the flora of the area of high rainfall, but it is also surely connected with the interests of the collector. Certainly the leafy liverworts are almost entirely absent from all other accounts of the flora. This lack is also probably due to the fact that most collectors, being phanerogamists, have collected only in the summer months when what liverworts there may be are almost completely shrivelled up. The same factor probably explains certain deficiencies in the mosses. For instance many of the small species inhabiting bare soil, belonging to the genera Seligeria, Phascum and Pottia, are either totally absent or



The distributional grid (squares 1–15) used in this paper. The numbers in brackets are the total number of species and varieties of bryophytes recorded for each square.

disproportionately represented—after all they are usually only found by bryologists browsing on all fours.

The distribution grid map used to divide up the country calls for some explanation. Fifteen squares are defined by the longitude lines at 4° intervals and the latitude lines at 38° and 40°N. Although these areas are at first sight rather crude they in fact coincide roughly with the major floristic regions of the country. The flora of the squares 1-5 along the Black Sea coast is predominantly Colchic in its affinities, with here and there a coastal belt of Mediterranean affinity. The flora of the western and southern seaboard (squares 6 and 11-13) is typically Mediterranean. The central plateau (squares 7-10 and 14-15) is occupied by a steppe vegetation of a predominantly Irano-turanian type. These aspects of the vegetation and their distribution are to be dealt with fully by my colleague Dr. P. H. Davis to whom I am indebted for many discussions on the subject. Given such a distribution of the higher plant vegetation the question at once arises is it possible to divide the bryophyte flora into 'elements' in the same way? Even the most cursory examination shows that it is not. This result is in agreement with the experience of most workers who have studied the distribution of bryophytes. Taking the whole of the circumboreal region there is a very large pool of widely distributed species which occur wherever micro-climatic conditions are suitable. Probably these conditions need be suitable only during a few months of the year, usually in early spring. Thus taken as a whole the bryophytes like the ferns do not seem to present the complicated patterns in Europe and neighbouring areas as the higher plants; certainly from the information available no patterns of subspecific differentiation comparable to that of some phanerogamic genera in Turkey are evident. These conclusions, however, rest upon information gathered by classical taxonomic methods. It may well be that, as Steere (1954) and others have very rightly pointed out in another context, the apparent widespread distribution of bryophyte taxa would appear in a very different light if other criteria including cytology could be adequately investigated.

The convenience of dividing Turkey into these fifteen areas lies of course in the fact that they delimit areas which accord fairly well in physical properties. Thus the five northern squares 1-5 contain mostly acid rocks, especially at the eastern end in the provinces from Giresun to Artvin. Within the four areas 2-5 the rainfall is very high on the northern side of the watershed reaching at least fifty inches in some localities. Furthermore this rainfall is spread fairly uniformly throughout the year. These factors together have permitted the survival of many species of atlantic affinity whose existence depends upon high humidity and acid substrate; good examples of these are Campylopus atrovirens, Hookeria lucens, Scleropodium illecebrum, Porella platyphylla. Much of this element continues eastwards in the similar conditions prevailing in the Caucasus and in the Elburz mountains of Northern Iran. Similarly, some predominantly Caucasian species penetrate westwards and reach their westernmost limit in the Pontic mountains, for example Pleuropus euchloron reaches its westernmost limit in the mountains near Hendek (Czeczott, 1939). A few of these species of the Pontus are widely disjunct; Hyocomium flagellare stretches westwards from Transcaucasia to the neighbourhood of Trabzon and does not reappear until Corsica is reached to the west, whence it has a

fairly wide distribution of a typically atlantic type. The two hepatics Lejeunea natens and Juhula hutchinsiae have similar distributions. Also within this pontic region, embracing all the northern squares, there occurs a richly developed woodland bryophyte flora associated with the Fagus orientalis. Abies nordmanniana and Picea orientalis forests. Here occur most of the species listed by Herzog in his study of the distribution of the Bryophyta (1926), as typical of Eurasian woodlands. These include Rhytidiadelphus triquetrus, R. squarrosus, Plagiothecium sylvaticum, Brachythecium rutabulum, Dicranum scoparium, D. majus, Mnium rostratum and M. affine, Polytrichum formosum, Plagiochila asplenioides. Lepidozia reptans. Porella platyphylla, Frullania dilatata and Radula complanata. All these, except Brachythecium rutabulum (7 and 14) and Mnium affine (8), are entirely confined to the northern squares 1-5. Another group of species with a similar distribution, but in this instance not so obviously linked with the woodlands, is that whose extra-Turkish distribution is primarily Atlantic or Atlantic-Mediterranean according to Herzog's classification. The most obvious of these are Tetraphis brownianum, Campylopus atrovirens, Fissidens crassipes, Tortella flavovirens, Funaria calcarea, Hookeria lucens, Scleropodium illecebrum, Eurynchium praelongum var, stokesii, Sematophyllum demissum and Plagiothecium undulatum. Most of these species are confined to the Black Sea region but a few also occur in the southern squares and these latter, e.g. Tortella flavovirens and Funaria calcarea, are not very strongly indicative of atlantic conditions.

In marked contrast to the distribution of these groups, is that of the group of species which Herzog treats as a true mediterranean xerothermic element, a notable feature of which, in contrast with the atlantic groups, is the rarity of epiphytic species. Furthermore the distribution is based on the circum-mediterranean countries, although some penetrate further north in warmer areas and often favour base-rich soils. This element is of much wider distribution in Turkey than the preceding atlantic groups, but the interpretation of its distribution is hampered by the relative lack of information about the central plateau squares. Present data indicate that almost half this element is confined to the marginal squares 1-5. 6 and 11-13; many of these are restricted to the southern five 11-15 including Tortella nitida, Bartramia stricta, Timmiella anomala, T. barbuloides and Scorpiurium deflexifolium. Those restricted to the seaboard squares include Pleurochaeta squarrosa, Scorpiurium circinatum, Pterogonium gracile and Eucladium verticillatum. Those of this group which also penetrate the central plateau squares are Tortula inermis, Crossidium squamigerum and its variety pottioideum and Camptothecium lutescens. In examining the distribution of this group, in which many species are markedly basiphilic, the fact that most of the limestone in Turkey occurs in the southern half of the country must be borne in mind and undoubtedly the distribution of many species is limited by this fact.

The species which can be considered as forming a steppe element in the flora are few in number. In Turkey they are confined to the central areas (6–10) and their extra-turkish distributions follow areas of irano-turanian climate in Iran and Iraq, North Africa and central Spain. The best examples are Tortula desertorum and Tortula natillasissing.

There remains a small group of endemic species and varieties, Most of these are known only from the type collections, which I have not seen, and certainly many require re-evaluation. Those in this category are Anoectangium handelii, Grimmia cucullata, Funaria handelii, Tayloria lingulata var. acutifolia, Mniobryum latifolium, Philonotis calcarea var. orthoplata and var. seriatifolia, Orthotrichum rupestre var. kurdicum, Amblystegium kurdicum, Rhynchostegium hausknechtii, Nardia handelii, Nardia handelii var. flaccida, Nardia subilissima and Nardia lignicola.

In the enumeration I have been forced to adopt the most generally accepted modern epithets without citing all the synonyms under which the records have been published, the list would have been too cumbersome otherwise. However, it is always possible to get back to the original source of my information by the system of reference adopted and any mistakes due to the extensive use of synonymy can be corrected. In many cases I have left in species and especially varieties whose validity is perhaps doubtful rather than lump them. These difficulties can only be resolved by examination of the collected material.

In the tables that follow, the grid square number, as shown on the map, is given at the head of each column and against each species a number occurs in the appropriate grid-square column from which it has been recorded. This number refers to the authority for the record, according to the following list.

No.	Reference	No.	Reference
1 F	Henderson & Muirhead, 1955	10	Penther & Zederbauer, 1905
2 - F	Henderson, III, 1958	11	Reimers, 1927
3 I	Henderson, II, 1957	12	Czeczott, 1939
4 F	Henderson, IV, 1961	13	Handel-Mazzetti, 1909
5 F	ritsch, 1900	14	Bornmüller, 1931
6 S	chiffner, 1913	15	Juratzka & Milde, 1870
7 S	chiffner, 1897	16	Wettstein, 1889
8 S	chiffner, 1908	17	Jovet-Ast, 1957
0 9	chiffner 1896	18	Bornmiller 1908

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Sphagnum compactum DC					-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
- teres (Schimp.) Angstr					-	-	-	4	-	-	-	-	-	-	-	-	-	- 10	-
squarrosum Pers. ex Crome					-	-	-	4	-	-	-	-	-	-	-	-	- 3	- 17	-
- subsecundum Nees			0.		-	-	-	13	-	-	-	-	-	-	-	-	-	- 4	-
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Polytrichum aloides Hedw					2	12	-	1	-	-	-	-	-	-	-	-	-	-	-
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alpinum Hedw					-	-	-	1	4	-	-	-	-	-	-	-	-	-	-
- var. septentrionale (Röhl.) I	ind	b.			-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
— piliferum Hedw					-	-	-	1	-	-	-	-	-	-	2.	-	-	-	-
- var. hoppei (Hornsch.) Rab.					-	-	-	9	_	-	-	-	-	-	-	-	-	-	-
- juniperinum Hedw					5	12	-	-	-	-	-	-	-	3	-	-	-	-	-
- var. alpinum Schimp.					-	-	-	13	-	-	-	10	-	-	-	-	-	-	-
gracile Sm					-	-	-	4	-	-	-	-	-	-	-	-	-	-	-
— formosum Hedw					-	-	-	4	4	-	-	-	-	-	-	-	-	-	-
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Ditrichum flexicaule (Schleich.) Hampe	-	14	-	1	-	-	4	-	-	-	-	-	-	-	-
— var. densum B.S.G	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Distichium capillaceum (Hedw.) B.S.G	-	14	-	4	4	-	-	10	-	2	-	-	-	-	3
- inclinatum (Hedw.) B.S.G	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Ceratodon purpureus (Hedw.) Brid	-	-	-	-	4	-	4	-	-	-	-	-	-	4	-
Seligeria recurvata (Hedw.) B.S.G.	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
Blindia acuta (Hedw.) B.S.G	-	-	-	11	-	-	-	-	-	-	-	-	-	-	-
Dicranella varia (Hedw.) Schimp	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
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heteromalla (Hedw.) Schimp	-	-	-	13	4	-	-	-	-	-	-	-	-	-	-
var. interrupta (Hedw.) B.S.G	-	-	13	13	-	-	-	-	-	-	-	-	-	-	-
Dichodontium pellucidum (Hedw.) Schimp	-	-	13	13	-	-	-	-	-	-	-	-	-	-	-
— var. flavescens (Turn.) C. Jens	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Dicranodontium denudatum (Brid.) Brit	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Dicranoweissia cirrata (Hedw.) Lindb	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-
- crispula (Hedw.) Lindb.	-	-	-	1	4	-	-	-	=	-	-	-	-	-	-
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montanum Hedw	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-
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— var. polycladum B.S.G	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
- scoparium Hedw	-	12	13	1	4	-	-	-	-	-	-	-	-	-	-
— var. polycarpum Breidl	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-
— rugosum Brid	-	-	-	1	-	-	-	-	-	-	-	-	8	-	
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BRYOPHYTE FLORA OF TURKEY:

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— sauteri (Schimp.) Loeske		-	-	-	13	-	-	-	-	_		-	_	-	_	
— fulvum (Hook.) Loeske		-	-	-	1	_	-	-	_	_	-	_	_			
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Leucobryum glaucum (Hedw.) Schimp.		-	-	-	4	_	-	-	_	_	_	_	_		_	
- albidum (Brid.) Lindb		-	-	-	13	-	-	-	_	_			_			
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— vulgaris Hedw		14	_	-	-	4	-	14		15	_	2	2	4	14	
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— intermedia (Brid.) Berk.		14	-	_	_	4	8		_	15	3			4	4	1
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canescens (Bruch) Mont		-	-	-	13	-	-	-	-	-	-	-	-	-	-	
— muralis Hedw.	- 1	5	-	-	8	-	-	14	14	15	-	-	-	4	4	1
— var. aestiva (Beauv.) Brid			-	-	-	=	-	-	-	-	-	=	-	-	6	1
— var. rupestris Schultz	THE STATE OF	14	-	-	-	-	-	-	-	=	-	-	-	-	-	
Desmatodon latifolius (Hedw.) B.S.G		-	-	-	-	-	-	-	10	-	-	-	-	-	-	1
— var. muticus Brid		-	-	-	-	-	-	-	10	-	-	-	-	-	-	

Aloina rigida (Hedw.) Kindb	6	-	-	-	-	-	-	10	-	-	-	-	-	-	-
var. pilifera B.S.G	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-
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Crossidium squamigerum (Viv.) Jur	14	-	7	-	-	-	-	2	15	-	-	-	6	-	-
- var. pottioideum (De Not.) Moenk	-	-	-	-	-	-	4	-	6	-	-	-	6	6	-
Pterygoneurum ovatum (Hedw.) Dix	_	-	7	-	-	-	14	10	15	-	-	-	15	15	-
Merceya acutiuscula (Lindb.) Chen	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
Stegonia latifolia (Schwaegr.) Vent	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-
Pottia lanceolata (Hedw.) C.M.	6	-	-	-	-	-	-	-	-	-	-	-	-	6	-
crinita Wils	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
starkeana (Hedw.) C.M.	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-
Cinclidotus nigricans (Brid.) Dix	-	-	-	-	-	-	-	-	6	-	_	2	-	-	2
Barbula convoluta Hedw.	-	-	_	-	-	-	-	-	-	-	-	-	15	-	-
— var. commutata (Jur.) Husn.	-	-	-	-	-	8	-	_	-	_	-	-	-	_	-
unguiculata Hedw	14	-	13	1	-	-	14	-	-	-	-	-	-	-	-
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spadicea Mitt	-	-	-	-	-	-	-	-	6	-	_	-	-	6	-
rigidula (Hedw.) Mitt,	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
trifaria (Hedw.) Mitt.	-	-	-	1	-	-	-	-	-	-	-	2	6	-	3
tophacea (Brid.) Mitt.	11	-	-	-	_	-	-	-	-	-	-	-	15	-	_
cylindrica (Tayl.) Schimp	6	-	13	13	-	-	-	-	-	-	2	-	-	-	-
vinealis Brid	14	-	-	=	-	-	4	15	6	-	2	2	6	6	-
recurvirostris (Hedw.) Dix	-	-	-	-	3	-	-	10	15	-	-	-	1	-	3
"Didymodon afer (C.M.) Broth."	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gymnostomum aeruginosum Sm.	-	-	-	13	-	-	-	2	6	-	-	-	-	-	3
— calcareum Nees & Hornsch.	-	-	-	-	-	-	-	-	-	-	2	-	-	2	-
var. viridulum (Brid.) B.S.G.	6	_	-	-	-	-	-	-	-	-	-	-	14	-	-
Anoectangium handelii Schiffn		-		-	-	-	-	-	-	-	-	-	_	6	-
Eucladium verticillatum (With.) B.S.G.	-	-	-	13	-	-	-	-	-		2	-	6		-
Tortella fragilis (Hook. & Wils, ex Drumm.) Limpr	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
tortuosa (Hedw.) Limpr	2	14	-	1	4	-	-	-	-	-	2	2	4	-	-
nitida (Lindb.) Broth.	_	-		-	-	-	-	-	-	-	2	-	4	-	-
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NOTES	
FROM	
THE	
ROYAL	
BOTANIC	
GARDE	

	Grid square	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fortella flavovirens (Bruch) Broth		-	-	_	-	-	-	-	-	-	-	-	2	-	-	-
		-	-	-	13	-	-	-	-	-		-	-	-	-	
Pleurochaete squarrosa (Brid.) Lindb		-	14	-	-	-	8	-	-	-	-	-	-	6	-	-
Frichostomum crispulum Bruch		-	-	-	13	-	-	-	-	-	-	2	2	4	-	-
		11	-	_	13	-	-	4	-	-	-	2	-	4	-	-
Fimmiella barbuloides (Brid.) Moenk.		-	-	-	-	-	_	_	-	-	-	2 2	2	4	-	-
— anomala (B.S.G.) Limpr		-	-	-	-	-	-	-	-	-	-	-	-	4	-	-
Weissia controversa Hedw		-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
— crispata (Nees & Hornsch.) Jur		-	-	13	13	-	_	-	-	6	_	-	-	_	-	-
— tortilis (Schwaegr.) C.M				-	-	_	_	-		_	_	-	_	6		_
— leptocarpa Schimp		23		3		-	_		1.00	_	_	_	_	16	_	_
— wimmeriana (Sendt.) B.S.G. var. mu									1					10		
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Breid.		6			13			_	2		-			4		
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GRIMMIACEAE			19				- 2					- 51				
Coscinodon cribrosus (Hedw.) Spruce		-	-	-	1	-	-	-	-	6	-	-	-	-	-	-
Grimmia apocarpa Hedw		-	2	-	1	-	-	-	-	6	-	-	-	4	6	-
— var. gracilis (Schwaegr.) Web.	Mohr.	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
- var. brunnescens (Limpr.) Moe		-	-	-	-	-	-	14	-	-	-	-	-	-	-	-
— conferta Funck		-	-	_	13	-	_	-	10	15	-	-	-	2	15	-
— anodon B.S.G.		_	_	_	-	_	_	_	15	15	2	_	10	4	6	1 2
— cucullata Henderson			-	-	-	-	_	2	-	_	_	_	-	-	_	
— flaccida (De Not.) Lindb	: : :			_	1	-		_		_	_	_		_		_
— plagiopoda Hedw					-	_		_	10				-	_	-	_
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— commutata Hüben		5		1000	1		-	14	10	15	-			4	4	1
laevigata (Brid.) Brid.			-	-	4	-	1		10		1000	-			-	
alpestris Schleich		-	-	-		-	-	-		- 6	-		-	-	-	-
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— tergestina Tomm		-	-	-	-	-	-	-	-	6	-	-	-	4	4	-
— ovalis (Hedw.) Lindb		-	-	-	-	4	4	-	10	-	-	-	-	4	-	-

Grimmia elongata Kaulf		_	1 - 1	-	1 4	1 -	-	1 -	-	- 1	-	-	-	-	- 1	-
— pulvinata (Hedw.) Sm.		4	2	_	4		8	14	2	15	-	2	-	4	4	-
— pulvinata (riedw.) Sili.		14	14	10	-	_	_	-		-	_	_	-	-	-	-
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orbicularis Bruch		14			1			14	_	6		-	_	_	6	_
var. persica Schiffn		-	-	-	4	4			-	-		-	_		_	
funalis (Schwaegr.) Schimp.		-	-	-	100						_		2	4	4	
trichophylla Grev		-	-	-	-	-	- 8	-	-			2		-4	-	_
subsp. meridionalis (Schimp.) Loeske .		-	-	-	-	-		1-	-	-	-		-	4	_	_
hartmanii Schimp		-	-	-	1	-	-	-	-	-	-	-	-		1000	_
decipiens (Schultz) Lindb		5	-	-	1	-	-	-	-	-	-	-	-	4	-	-
elatior Bruch		-	-	-	1	4	-	-	-	-	-	-	-	-	-	-
Rhacomitrium aciculare (Hedw.) Brid		-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
aquaticum (Brid.) Brid		-	-	13	-	-	-	-	-	-	-	-	-	-	-	-
heterostichum (Hedw.) Brid		-	-	-	4	-	-	-	-	-	-	-	-	-	-	-
- var. alopecurum Hüben		-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
var. gracilescens B.S.G		-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
canescens Brid		-	-	-	4	-	-	-	-	-	-	-	-	-	-	-
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- lanuginosum (Hedw.) Brid.		-	-	-	11	-	-	-	-	-	-	-	-	-	-	-
- lanuginosum (ricum.) Driu.				1	13	-	-		-						100	
FUNARIACEAE			100	-		14.1	-				-	- 30	1	143	. 9	-2.
Funaria muehlenbergii Turn		-	-	-	12	-	-	-	-	-	-	-	-	-	15	-
— hygrometrica Hedw		5	-	-	11	_	-	-	-	_	-	-	2	-	15	-
- mediterranea Lindb		-			-			14	12	15	_	-	-	15	-	-
— anomala Jur.								-		-	-	-	-	-	15	-
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handelii Schiffn.		_	-		11			14	_	_	2		-	- 2	-	-
Physcomitrium pyriforme (Hedw.) Brid		-	-	-	11	-	-									
delicatether (Hadin's Discussion)			100	-57				12			100				100	
SPLACHNACEAE	100		100	10.19		100				6	_			_	-	
Tayloria lingulata (Dicks.) Lindb. var. acutifolia Sch	uttn.	-	-	-	-	-	-	-	-	0	-	-			-	
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BRYACEAE								-	-2			7.3	1331			
Pohlia elongata Hedw		-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
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BRYOPHYTE FLORA OF TURKEY: V

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NOTES FROM	
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THE	
ROYAL	
THE ROYAL BOTANIC GARDEN	
GARDEN	

Grid square	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pohlia drummondii (C.M.) Andrews	-	_	-	-	-	_	_	2	-	3	_	-	_	-	_
	-	-	13	-	-	-	-	-	-	-	-		-	-	-
— ludwigii (Spreng.) Broth	-	-	_	1	-	_	_	_	-	_	-	-	_	-	-
Mniobryum albicans (Wahl.) Limpr	-	14	-	-	-	-	-	-	-	3	-	-	-	-	-
— delicatulum (Hedw.) Dix		-	-	-	-	-	-	-	-	3	-	_	-	-	-
— latifolium Schiffn	-	-	-	-	-	-	-	-	6	-	-	1	-	-	-
Plagiobryum zierii (Dicks.) Lindb	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-
Anomobryum concinnatum (Spruce) Lindb	-	-	-	13	_	-	_	-	-	-	_	-	_	-	-
Bryum pallens (Brid.) Röhl	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
— turbinatum (Hedw.) Sm	-	-	-	-	-	-	4	15	-	-	-	-	4	-	3
	-	-	-	-	-	-	-	15	-	-	-	-	-	-	-
- schleicheri Schwaegr	-	-	-	-	4	-	-	-	-	-	-	-	-	-	3
var. latifolium (Schleich.) Schimp	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-
- neodamense Itzigs	-	-	-	1	-	-	-	-	-	-	-	-	_	-	-
pseudotriquetrum (Hedw.) Schwaegr	-	-	-	13	-	-	-	10	6	-	-	-	1	-	-
var. latifolium (Lindb.) Limpr	-	-	_	9	-	_	-	_	_	-	-	-	-	-	-
- affine (Bruch) Schultz. var. cirratum (H. & H.)		-	130	110						-			1050	35	
Braithw	-	-	-	-	-	-	-	15	15	-	-	-	15	-	-
— funckii Schwaegr	-	-	-	-	-	-	4	-	-	-	-	-	6	-	3
caespiticium Hedw	6	-	-	-	-	-	2	10	6	-	-	-	4	-	3
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var. badium (Bruch ex Ruthe) Brid	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-
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var. lanatum (Beauv.) B.S.G	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-
— alpinum With	-	-	-	-	-	-	14	10		-	-	-	-	-	-
— mildeanum Jur	14	-	-	-	-	-	-	-	-	-	-	-	14	6	-
— donianum Grev	-	-	-	13	-	-	-	-	-	-	-	-	-	6	-
— capillare Hedw	2	-	-	11	4	-	4	10	4	-	2	2	4	-	_
	14	-	-	9	-	-	-	-	6	-	-	10	4	-	-
— var. macrocarpum Hüben	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-
	-	14	-	13	-	-	-	-	-	-	-	-	-	-	-
Rhodobryum roseum (Hedw.) Limpr	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-

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ex B	AULACOMNIACEAE ire (Hedw.) Schwa fedw.) Schwaegr.	Bartamatcaea W. W. W. W. J. Limpr. w. J. Dinpr. sn
MNIACEAE S.G	edw.	KRTRAMIACE Limpr. Cedw. Edw. Brid. Brid. Brid. Shilm. Schilm. Ia Schilm. Ia Schilfn. Ia Schilfn. Ia Schilfn. Thamiaceae
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MNACARE our horrum Hedw. orthorthynchum B.S.G. stellare Hedw. stellare Hedw. longinestrum Brid. longinestrum Brid. undulatum Hedw.	AULACOMNIACEAE icomnium palustre (Hedw.) Schwa- androgynum (Hedw.) Schwaegr.	Plagopus cederi (Glid.) Limp. Bertrannia indiricana Hedwo. intopylula Brid. sirica Brid. Philotoria zanelii Heast. Philotoria zanelii Heast. control proportional televol. Brid. control proportional televol. control proportional televol. var. controlophila Schili runnia bavarica Heast. Timmia bavarica Heast.
Mnium hornum Hedw. — orthorthynchum B — marginatum (With — stallare Hedw. — cuspidatum Hedw. — longirostrum Brid. — indulatum Hedw. — undulatum Hedw. — undulatum Hedw.	AULACOMNIACEAE Aulacomnium palustre (Hedw.) Schwaegr. —— androgynum (Hedw.) Schwaegr.	Plagiopus cederi (Ridaria Authoria Plagiopus cederi (Gird.) Limp. Bartumia halieriana Hedw. Implyalia Brid. striciu Brid. marchia Hedw. Philotopiylia Brid. Franchia Hedw. marchia Hedw. marchia Hedw. marchia Hedw. parama Hedw.) Brid. striciu Brid. marchia Hedw.) Brid. striciu Mith. Jindh. eduzeu (B. K.O. Schimp. var. orthophylia Schim var. orthophylia Schim var. seriatifolia Schiff Timmia bavarica Hedw.
Maniu	Aulac	Plagia Bartra Bartra Philo Philo

- Boovette System	Grid square	quare	1	2	3	4	5	9	1	- 00	6	10	=	12	13	14	15
ORTHOTRICHACEAE					Ì		İ	İ	Ì	Ì	i	i	t	İ	İ	Ì	1
Amphidium mougeotii (B.S.G.) Schimp.			1	I	1	4	1	1	1	1	1	1	1	1	T	1	1
Orthotrichum rupestre Schleich			1	1	1	1	4	1	1	10	1	1	1	1	4	1	,
var. kurdicum Schiffn.			1	1	1	1	1	1	1	1	9	1	1	1	1	1	1
anomalum Hedw.			14	1	1	1	1	1	1	10	1	1	1	1	4	1	1
var. saxatile (Wood) Milde .			1	1	1	1	1	1	1	10	1	1	1	1	1	4	1
cupulatum Brid			14	T	1	1	1	80	1	7	9	1	1	1	3	4	2
var. bistratosum Schiffn.			1	1	1	1	1	1	1	9	9	1	1	1	-	9	1
urnigerum Myrin			1	1	1	1	1	1	1	1	1	1	,	1	4	1	1
affine Brid.			1	1	7	1	1	1	1	1	1	1	1	1	1	1	1
fastigiatum Bruch			1	1	7	T	1	1	1	1	1	1	1	1	1	1	1
striatum Hedw.			1	1	1	13	1	1	1	1	1	1	1	1	4	1	1
lyellii Hook. & Tayl.			1	1	1	13	1	1	1	1	1	1	1	1	T	1	1
stramineum Hornsch.			1	1	1	13	1	1	1	1	1	1	1	1	1	1	1
pallens Bruch			1	1	7	1	1	1	1	1	1	1	1	1	1	1	1
diaphanum Brid.			14	1	1	13	1	1	1	1	1	1	1	1	1	1	1
Ulota crispa (Hedw.) Brid.			1	1	13	1	1	1	1	1	1	1	1	1	1	1	1
crispula Bruch			1	1	1	13	1	1	1	1	1	1	1	1	1	1	1
FONTINALACEAE						1	-	N.		10		1	4		-	7	
Fontinalis antipyretica Hedw			2	1	1	13	4	1	14	1	1	1	1	-	3	1	1
Conscious														17			
Climacium dendroides (Hedw.) Web, & Mohr	ohr .		1	1	1	13	1	1	1	1	1	1	1	1	1	1	1
				127				1		1			À				
HEDWIGIACEAE				-		+	7	4		(6)							
Hedwigia ciliata (Hedw.) Beauv.			2	14	1	-	4	1	1	1	1	1	1	1	î	1	1
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LEUCODONTACEAE									1						1		
Leucodon sciuroides (Hedw.) Schwaegr.			1	1	1	-	1.	1 9	1	1	1	1	7	7	4	1	1
var. morensis (Schwaegr.) De Not.	ot.		1	1	1 :	1	4	00	1	1	1	1	7	_	4	1	1
immersus Lindb.			1	1	13	1	1	1	1	1	1	1	1	ŀ	1	1	1
Antitrichia curtipendula (Hedw.) Brid.			1	1	1	_	1	1	1	1	1		1	1	1	1	1

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Antitrichia californica Sull	1 -	1 -	-	-	_	- 1	-	-	-	-	-	-	1 1	-	-
— breidleriana Schiffn		10	-	- 1	_	8	13	_	6	-	-	_	-	-	-
Pterogonium gracile (Hedw.) Sm.	14	-	-		_	8	-	_	_	_	2	-	4	-	-
Pterogonium graciie (Fiedw.) Sin.	1.4		3	71			14	199			-			1,000	
Neckeraceae	1	10	1 9 1			.8				3		3	C Of Y	12	
Leptodon smithii (Hedw.) Mohr	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-
Neckera crispa Hedw	-	12	-	1	-	-	-	-	-	-	-	-	4	-	-
— complanata (Hedw.) Hüben	14	_	-	1	_	-	_	-	-	-	-	-	4	-	-
— menziesii Hook	-	12	-	1	_	-	_	-	_	_	_	-	4	=	-
Thamnium alopecurum (Hedw.) B.S.G.	5	12	_	1	-	-	-		-	-	_	-	=	-	-
Thaininum aiopecurum (ricuw.) B.S.G.	-	1.2	100				1			1000		100	1,79		
HOOKERIACEAE	1 19	-	1	131				5				700			15.
Hookeria lucens (Hedw.) Sm	-	_	-	4	-	-	-	-	-	-	-	-	-	-	-
Trookeria ideelis (tream) siin				1	. 13					190		1			
THELIACEAE		100		0.00	7.90			180		9			1.9%		
Myurella apiculata (Schwaegr.) B.S.G	-	-	-	12	_	-	_	14	-	-	-	-	-	-	-
— tenerrima (Brid.) Lindb	-	_	_	3				10	_	2	_	_	_	-	_
tenerrima (Brid.) Enido.					7			10				1990			-
LESKEACEAE		13	-	1.18	3			- 13		197		1			
Leskea incrassata Lindb	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
Lescuraea mutabilis (Brid.) Lindb	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
	_	-	-	1	4	-	-	-	-	-	-	-	4	-	-
saviana (De Not.) Lawton	_	14	-	1	4	-	-	-	***		=	-	-	-	-
Pseudoleskea incurvata (Hedw.) Dix	_	-	-	13	-	-	-	-	-	2	-	-	4	-	-
— incurvata (as atrovirens var. revoluta Schiffn.)	-	_	-	9	_	-	-	-	-	_	-	-	-	-	-
Incurvata (as atterness ratt revoluta semina)			1990	11	1000					177		U TO		750	
THUIDIACEAE				13	7			. 3					12	18	
Heterocladium squarrulosum (Voit.) Lindb	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
Anomodon rugelii (C.M.) Keissler	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
- attenuatus (Hedw.) Hüben	-	U	13	13	-	-	-	-	-	-	-	-	-	-	-
- viticulosus (Hedw.) Hook. & Tayl	-	12	13	1	-	-	-	-	-	_	-	-	-	-	-
Thuidium abietinum (Brid.) B.S.G	L.	-	3	13	-	-	-	-	-	-	-	-	-	-	-
— tamariscinum (Hedw.) B.S.G	-	13	1 5	4	-	-	U	-	-	-	-	-	-	-	-
— delicatulum (Hedw.) Mitt	_	-	-	13	-	-	-	-	-	-	-	-	4	-	-
— recognitum Lindb	_	1	1	11	-	2	7	-	_	1	4	-	-		-
recognition and a	1		1	1.00			1								

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AMBLYSTEGIACEAE	-	-	75.4	-	_	_	-	-	_	100		-		-	-
Cratoneuron filicinum (Hedw.) Roth	9	14	-	-	-	-	14	2	6	2	-	-	1	-	3
var. fallax (Brid.) Moenk	14	-	-	9	-	-	-	-	-	3	-	-	-	-	-
commutatum (Hedw.) Roth	-	14	-	1		-	14	162	6	3	-	-	-	-	3
var. falcatum (Brid.) Moenk	-	14	-	1	-	-	-	-	-	2	-	-	1	-	3
decipens (De Not.) Loeske	-	-	-	9	_	-	-	_	-	2	_	-	-	-	3
- var. napaeiforme (Schiffn.) Podp.	-	-	-	12	-	-	-	152	6	-	-	-	-	-	-
Hygroamblystegium tenax (Hedw.) Jennings	-	-	-	13	-	-	-	2	4	-	-	-	_	-	-
— fluviatile (Hedw.) Loeske	-	-	-	11	-	-	-	-	_	-	_	-	-	-	-
- f. spinifolia Moenk	-	-	-	-	-	_	-	2	-	-	-	-	-	-	-
Amblystegium serpens (Hedw.) B.S.G.	-	-	_	_	_	_	4	15	_	-	_	-	-	_	-
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Drepanocladus aduncus (Hedw.) Warnst	-	-	-	_	-	_	-	_	-	3	_	-	-	-	-
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vernicosus (Lindb.) Warnst	-	-	_	-	4	_	-	-	_	-	_	_	-	-	-
uncinatus (Hedw.) Warnst.	-	12		1	4	_	_	_	_	_	_	_	_	_	_
— capillifolius (Warnst.) Roth var. dichelymoides								-							
Roth & Bock	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
Hygrohypnum luridum (Hedw.) Jennings		-	-	13	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Acrocladium cuspidatum (Hedw.) Lindb	-	-	-	7	13	-	-	-	-	-	-	-	-	-	3
— var. pungens Schimp	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
BRACHYTHECIACEAE															
Isothecium myurum (Brid.) Brid	14	12	-	13	-	-	-	-	-	-	-	-	4	-	-
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striatulum (Spruce) Kindb.	1 -	-	-	1	-	_	-	-	_	-	_	_	-	-	-
Scorpiurium circinatum (Brid.) Fleisch. & Loeske .	-	-	-	13	-	-	-	-	-	-	2	-	15	-	-
- deflexifolium (Solms-Laub.) Fleisch. & Loeske	-	-	-	-	-	-	-	-	-	-	-	_	-	-	3
Camptothecium sericeum (Hedw.) Kindb	2	12	_	9	4	8	-	2	6	2	2	2	4	4	-
lutescens (Hedw.) B.S.G	14	-	3	1	-	-	14	-	-	-	2 2	2 2	4	-	-
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philippeanum (Spruce) Kindb	14	14	-	-	-	-	14	-	6	-	-	-	4	-	-

Camptothecium aureum B.S.G	1 14	-	-	1 -	- 1	8	-	-	-	- 1	1 2	1 -	1 4	1 -	1 -
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— rutabulum (Hedw.) B.S.G.	_	12	_	13	_	_	_	15	_	_				6	
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- var. turgescens Warnst.	1-4	-		1			_	14	0	3	_	-	4	-	-
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populeum (Hedw.) B.S.G	14	-	-	13	-	-	-	-	-	-	-	-	-	-	-
collinum (Schleich.) B.S.G	-	-	-	-	-	-	-	1	6	2	-	-	-	-	3
trachypodium (Funck) B.S.G	-	-	-	-	-	-	-		-	2	-	-	-	-	-
Scleropodium illecebrum (Hedw.) B.S.G	4	-	13	-	-	-	-	-	-	-	2	-	-	-	-
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— zetterstedtii Størm	-	-	-	1	4	_	-	-	-	-	-	-	-	-	-
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- revolutum (Mitt.) Lindb		-	-	-	1	-	-	-	-	-	3	-	-	1	-	1
- arcuatum Lindb		_	-	-	13	-	-	-	-	-	-	-	-	-	-	
— hamulosum B.S.G.		_	14	_	-	-	_	-	-	-	-	-	-	-	-	
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RICCIACEAE Riccia bischoffii Hüb					14	-	-	-	_	-	-	-	-	-	-	-	-	-	=	
Clevea rousseliana (Mont.) Leit.					-	-	-	7	-	=	-	10	=	-	-	-	-			
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TARGIONIACEAE Cargionia hypophylla L					_	_	_	-	_	8	_	-	-	_	2	_	4	-	_	
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Riccardia multifida (L.) S. F. Gray			1	1	1	1	1	1	1	1	13	1	1	1	1	1	1
Pellia epiphylla (L). Corda			1.1	11	- 11		1.1	1 ∞	1.1	1.1	1 0	1.1	1.1	1.1	111	1.1	1.1
Merzgeria furcata (L.) Dum. — conjugata Lindb. — pubescens (Schrank) Raddi			1.1.1	111	1 13 1		111	111	111	ELL	111	111	111	111	141	1.1.1	111
Blasia pusilla L.			T.	1	1	-	1	- 1	1	1	P	1	1	1	21	1	-1
Fossombronia angulosa (Dicks.) Raddi			1	1	1	13	1	1	1	Ē	1	ı	1	1	1	1	-
Ртилилеле Anthelia julacea (L.) Dum. Blepharostoma trichophyllum (L.) Dum.			1.1	r r	11	13.1	1.1	- FC	11	1.0	1.1	1.1	11	1.1	1.0	1.1	1.1
Lepudoziaceae Bazzania tricrenata (Wahl.) Trev. Lepidozia reptans (L.) Dum.			1.1	1.1	1.1	13	1.1	1.1	1.1	1.1	1.1	1.1	1.1	2 11	1.1	1.1	1.1
Calypogeia trichomanis (L.) Corda emend. Buch	. Buch .		1	- 1	1	-	- 1	1	1	i	1	1	1	1	1	1	1
Lophozia ventricosa (Dicks.) Dum. — porphyroleuca (Nees) Schiffn. — alpestris (Schl.) Evans			2111	111	111	13 13	1.1.1	2011	111	1.1.1	11.1	111	201.1	21.1.1	111	111	1.1.1

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) Macoun	örg	fart.) Loeske	. (Huds.) Buch	Symnocolea acutiloba (Kaal.) K. Müll. var. heterostipoides			Incommentation	MANNIACEAE	K. Mull	sphaerocarpum (Hook.) Steph. (as Aplozia amplexi-		Mitt.		av		Shiffn				MARSUPELLACEAE	C) Steph	& Mohr) Dum	es month Dunit.			3ymnomitrion concinnatum (Lightf.) Corda var. inter-			PLAGIOCHILACEAE	.) Dum.	9	(Torr) Lindh		HABBANTHACEAE	Dum	
Lophozia longidens (Lindb.) Macoun .	Leiocolea muelleri (Ness) Jörg,	Barbilophozia attenuata (Mart.) Loeske	Tritomaria quinquedentata (Huds.) Bucl	Gymnocolea acutiloba (Kaa.	Schiffn.		Instant	JUNGER	Solenostoma triste (Nees) K. Mull.	- sphaerocarpum (Hook	caulis Dum.)	Plectocolea obovata (Nees) Mitt	- hvalina (Lvell) Mitt.	Nardia compressa S.F. Grav	handelii Schiffn.	handelli var flaccida Shiffn	Halldelli val. Hacelda	- subtilissima Schiffn.	lignicola Schiffn.	MARSU	Tamesoniella autumnalis (DC) Stenh	Marginalla Ginekii (Web & Mobr) Dum	Maisupena Junekii (weo.	- var. major Nees	emarginata (Ehrh.) Dum	Gymnomitrion concinnatur	medium Limpr.		PLAGIC	Plagiochila asplenioides (L.) Dum.	- var. minor Lindb.	John Torrelloides (Torr) Lindh	tar: porchologe	HABBA	Lophocolea bidentata (L.) Dum.	

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CEPHALOZIACEAE		_	_			-	_		_	_		_		_	_	_
Cephalozia bicuspidata (L.) Dum		-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
— catenulata (Hüb.) Spr		-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
Nowellia curvifolia (Dicks.) Mitt		-	-	-	13	-		-	-	-	-	-	-	-	-	-
Diplophyllum albicans (L.) Dum		-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
taxifolium (Wahl.) Dum		-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
SCAPANIACEAE		139			111	100			-	1884		-3.6	3.3			19
Scapania curta (Mart.) Dum		-	-	-	11	-	-	-	-	-	-	-	-	-	-	-
- irrigua (Nees) Dum		-	-	-	9	-	-	-	-	-	-	-	-	-	-	-
umbrosa (Schrad.) Dum		-	-	-	13	-	-	-	-	-	-	-	-	-	-	_
aequiloba (Schwaegr.) Dum	de louis	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
- verrucosa Heeg		-	-	13	1	-	-	-	-	-	-	-	-	-	-	-
— aspera Bernet		-	-	_	1	-	-	-	-	-	-	-	-	-	-	-
memorosa (L.) Dum		-	-	13	13	-	-	-	-	-	-	-	-	-	-	-
var. fallaciosa Schiffn		-	-	-	13	-	-	-	-	-	-	-	-	-	-	_
— undulata (L.) Dum		14	-	-	13	-	-	-	-	-	_	-	-	-	-	-
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RADULACEAE					11											
Radula complanata (L.) Dum		14	_	-	1	_	_	-	_	_	_	_	_	-	_	_
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PORELLACEAE						100		100								
Porella platyphylla (L.) Lindb		-	-	7	13	-	-	-	-	-	-	-	-	4	-	-
— cordeana (Hüb.) Evans		-	14	-	-	-	-	14	-	-	-	-	-	-	-	-
LEJEUNEACEAE						176										
Lejeunea cavifolia (Ehrh.) Lindb		-	-	13	-	-	-	-	-	-	-	-	-	-	-	-
— patens Lindb		-		-	11	-	-	-	-	-	-	-	-	-	-	-
Jubula hutchinsiae (Hook.) Dum. var. sullivar	tii Spruce	-	-	13	13	-	-	-	-	-	-	-	-	-	-	-
FRULLANIACEAE					1											
Frullania tamarisci (L.) Dum		6	-	-	1	-	-	-	-	-	-	-	-	4	-	-
var. atrovirens Carr. (as var. blanda	De Not.)	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-
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